Strength Characteristics of Mortar Containing Different Sizes Glass Powder

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***Abstract*—A greater portion of nonrecyclable waste glass is accumulated on landfills creating a serious environmental problem. Recent studies have been carried out to utilize the waste glass in construction as partial replacement of cement. This paper investigates the fineness properties of four sizes glass particles and strength characteristics of mortar in which cement is partially replaced with glass powder in the replacement level with 10%, 20%, 30% and 40%. Mortar cubes containing with varying particle sizes in the ranges of 212 µm, 75 µm, 63-38 µm and lower than 38 µm and in a water to cement ratio 0f 0.50 and 0.45 have been prepared. Room temperature and relative humidity have been maintained 32ºC and 90% respectively during the curing process. Replacement of 10% cement with glass powder reveals the higher compressive strength at 28days than other levels of replacement. The reduction in compressive strength increases with the level of cement replacement.**

***Keywords*:** Waste glass powder, cement replacement, compressive strength, 28days.

I. INTRODUCTION

THE generation of waste materials has increased according to the rapid growth of industry and population explosion. The greater portion of these materials do not decompose by itself accumulated on the landfill areas, will remain in the environment for many years, thereby contributing to the environmental problems. The utilization of waste material in construction industries has been increased significantly, in the recent years owing to the short or long term properties of concrete without compromising concrete performance [1]. Waste glass is one such material, which is encouraged for recycling. Theoretically, glass is a 100% recyclable material; it can be indefinitely recycled without any loss of quality [2]. Nevertheless, the recycling rate of waste glass is quite low compared to the other solid wastes because of expensive cleaning and color sorting cost [3]. Environmental regulations and deficiency of landfill space are also encouraging the use of waste glass in concrete production.Several studies were carried out on the use of waste glass as an aggregate for concrete production in the 1960s. The first practice was conducted by Schmidt and Saia [4], 1963 to the use of glass chips to produced architectural exposed aggregate for concrete.

The effect on mechanical properties of using waste glass in concrete had been studied by many other researchers, including Johnston (1974), Figg (1981)[5]-[6]. Owing to high disposal cost of waste glass and environmental regulation the use of glass as cement concrete aggregates has attracted again under attention of the researchers in the last 20 years [7]-[13]. This aggregate was applied in road construction and also used for production of glass tiles, wall panels, bricks, glass fibre, agriculture fertilizer landscaping reflective beads and tableware [14].

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